# hydro in the northwest





# power and progress

Ontario Hydro's association with the development of Northwestern Ontario dates back to 1910, when the Commission built a four-mile transmission line and a substation to serve the City of Port Arthur with power purchased from the privately-owned Kakabeka generating station on the Kaministikwia River. Supplemented by the output of a municipally-owned power development constructed in 1901 within the city limits on the Current River, the Hydro service gave added impetus to early development of the area's economic potential.

Port Arthur, which in 1970 merged with the City of Fort William to form the City of Thunder Bay, was thus among the first municipalities in the province to receive service from Ontario Hydro.

New industry followed and this, together with the expansion of municipal services and the need for power to open up rich mineral and forestry based resources, increased demands for electricity to the point where Ontario Hydro had to seek additional sources of supply.

As the first major step in the development of a power system to serve the vast Northwestern area, Hydro built a generating station at Cameron Falls on the Nipigon River. It came into service in 1920 and marked the beginning of a continuing expansion program to meet the electrical requirements of an area larger than Great Britain and Northern Ireland combined.

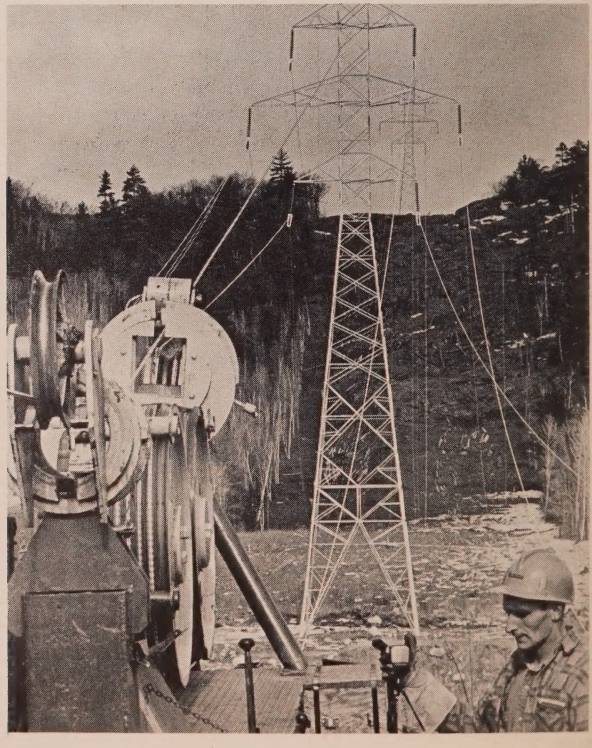
For administrative purposes, Ontario Hydro divides the province into seven regions. The Northwestern Region serves an area 94,800 square miles in extent and its generating stations have a combined capacity of over 700,000 kilowatts. They are situated on the major river systems and they include a coal-burning station at Thunder Bay.

Dynamic is the word most often used to describe the development of Northwestern Ontario and its economic potential is great. Ontario Hydro shares this optimism and continues to improve and expand the facilities necessary to provide vital electrical service. Hydro's Northwestern power grid has just recently been tied in with the system serving the rest of the province and a transmission system is being built from Atikokan to the Manitoba border to accept purchased power from Manitoba Hydro's giant Nelson River project.

Prior to the completion of the East-West tie-line in 1970, Ontario Hydro had operated two separate systems: the East system, supplying Southern and Northeastern Ontario; and the West system, serving Northwestern Ontario.

The 500-mile gap was closed with a 230,000 volt double-circuit transmission line constructed across some of the most rugged terrain in the world. For the first time, it became possible to transfer power in large quantities and in either direction between the East and West systems. Ontario is now served with a single integrated Hydro grid covering an area of 250,000 square miles.

Northwestern Ontario thus becomes part of a vast inter-connected continental grid reaching from James Bay south to the Gulf of Mexico, and extending from the Atlantic to the Pacific coast. This is by far the largest power pool in the world. Its basic purpose is mutual security and operating economies. Utilities within the grid help one another in the event of power shortages or interruptions and they can buy or sell power to their mutual advantage.



Completion of the East-West inter-connection means that the Northwest will be able to share in the benefits of all new Commission developments, including the giant nuclear and fossil-fuel stations being added to the system in the south.

## Manitoba inter-connection

Construction of 400 miles of 230,000-volt transmission line from Atikokan to the Manitoba border further assures the power supply of the Northwestern Region. Under an agreement with Ontario Hydro, Manitoba Hydro is to deliver 50,000 kilowatts in 1972; 100,000 from 1973 to 1974; 200,000 from 1974 to 1977, and 100,000 during 1977-78.

Cost of the transmission line was estimated at about $48 million. But the cost of purchasing power from Manitoba will be substantially less than the alternative—construction and operation of a new generating station with all the ancillary facilities.

# nipigon river plants

## cameron falls g.s.

The Nipigon River falls 250 feet in its turbulent 40-mile rush from Lake Nipigon to Lake Superior and it has played a key part in Ontario Hydro operations in the northwest since December 20, 1920. Power began flowing that day from the first two units of the Commission's Cameron Falls generating station to the twin cities of Port Arthur and Fort William, about 65 miles to the southwest.

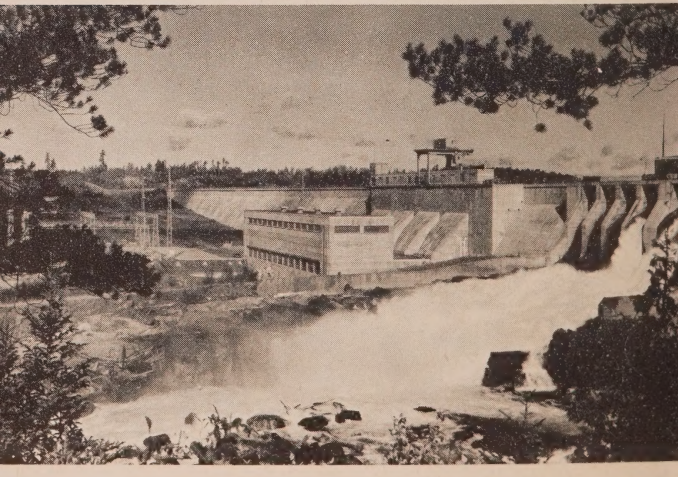
Five additional units have since been placed in service at Cameron Falls, the last in 1958, giving the station a capacity of 72,000 kilowatts.

## pine portage g.s.

Twelve miles upstream from Cameron Falls is the Pine Portage generating station, Hydro's giant of the northwest, with a capacity of 128,700 kilowatts from four units.

Built in two stages, with two units being placed in service in 1950, and two in 1954, Pine Portage was the Commission's answer to soaring power demands generated by the boom that followed the Second World War.

Features of the Pine Portage plant include the 3,000-foot-long dam spanning the river, the 600-foot tailrace channel cut through solid rock, and a 700-foot-long steel log slide allowing more than half a million cords of waterborne pulpwood a season to by-pass the dam.



### alexander g.s.

Alexander generating station, the smallest of the three Nipigon plants, with a capacity of 65,300 kilowatts, is located a mile and one-half downstream from Cameron Falls. Two of the station's five units were placed in service in 1930. Another followed in 1931, and the fourth and fifth went into service in 1945 and 1958.

Preliminary to the installation of the fourth unit, Ogoki River water was diverted into the Nipigon to increase its power making potential.

Power from the Nipigon stations is transmitted to the industrial Thunder Bay area and also serves consumers in the Lake Nipigon district. The Pine Portage and Alexander stations are operated by remote control from the Cameron Falls plant, where an operators' colony was established in 1920.

## power from the english river

### ear falls g.s.

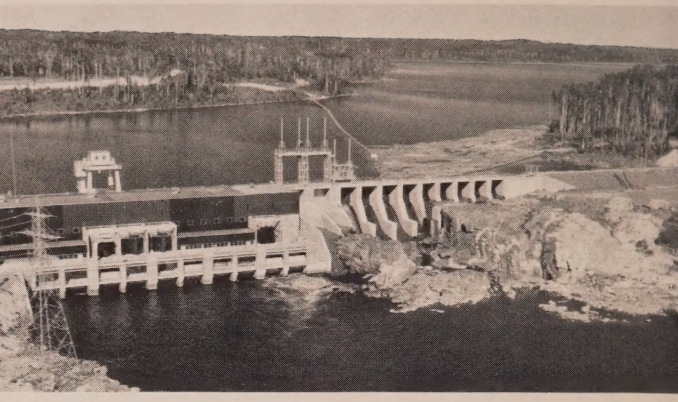
Ontario Hydro's Ear Falls generating station on the English River, north of Dryden, is the oldest and smallest of the Commission's three hydro-electric plants on this water-way. The first of the station's four units was placed in service on Christmas Day, 1929, and since then the plant has contributed much to the development of the mineral resources of the Ontario northwest.

Additional units were installed as the demand for power increased from the mining areas. Completion of the final unit in 1948 brought the station's capacity to 18,600 kilowatts.

Nearby Lac Seul provides Ear Falls with a natural reservoir 594 square miles in extent with storage for nearly four million acre-feet of water. The 600-foot-long concrete dam provides a normal operating head of 36 feet of water to drive the station's generators.

### manitou falls g.s.

Manitou Falls generating station, located about 20 miles downstream from Ear Falls, is operated by supervisory control from the Ear Falls plant by means of a U.H.F. radio link.

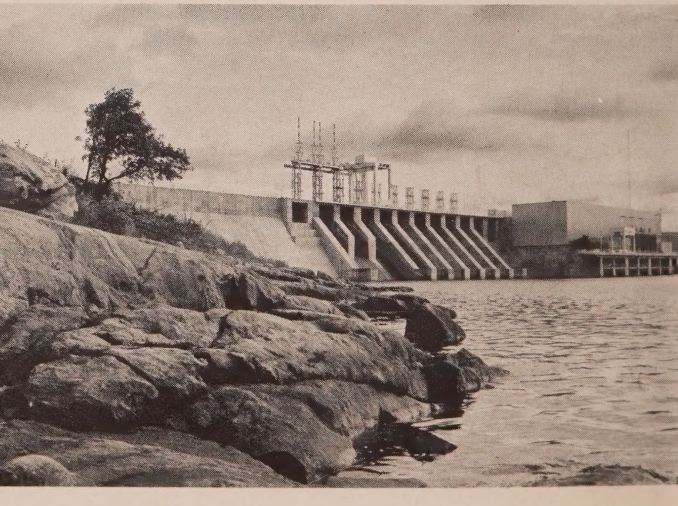


High labor costs and the problem of providing housing and other facilities at remote sites are among the reasons why Hydro operates stations like Manitou Falls by remote control.

Carved out of rock, dense bush and muskeg, access to the 72,000-kilowatt Manitou Falls development required construction of a 14-mile road, involved use of a ferry, and construction of a 370-foot long Bailey bridge to bring in equipment and supplies for the powerhouse, which is an integral part of a 1,000-foot-long dam spanning the river.

Placed in service in 1956, and completed in 1958, the project was supervised by the youngest team of engineers (average age: 35) Hydro had up to that time placed in charge of such a large undertaking.

## caribou falls g.s.



Located on the English River about 40 miles northwest of Kenora, at the junction of the Winnipeg River, Caribou Falls generating station began producing power in 1958. It was the last and the largest hydro-electric project undertaken by Ontario Hydro in this remote section of the province near the Manitoba border.

Construction of the station required the clearing of 22,000 acres of land for the headpond alone, the most extensive operation of its kind ever carried out by Hydro. It also involved the building of a 17-mile access road from Whitedog Falls on the nearby Winnipeg River. Construction of the two stations was carried out concurrently and the one construction camp served both projects.

As there wasn't any connection to a major highway, all personnel and equipment had to be transported by rail or air to a central location at Pistol Lake on the C.N.R. railway just west of Minaki.

The 3-unit, 77,000-kilowatt Caribou Falls station is similar in design to the Whitedog Falls plant, and like it is operated by remote control from Kenora.

# kaministikwia river

## kakabeka falls g.s.

Once an important route for fur traders between Fort William and the Canadian West, the Kaministikwia River has had a unique role in the history of hydro-electric generation in Ontario since the opening in 1906 of Kakabeka Falls generating station.

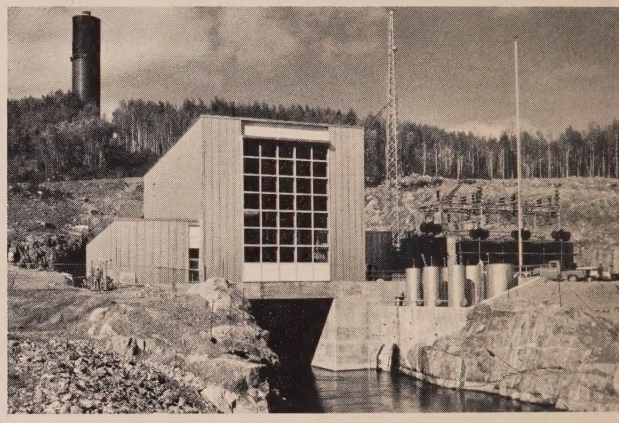
Developed by local interests to supply the electrical needs of the Lakehead area, power from the plant had to be transmitted a distance of 20 miles, a feat of some magnitude at a time when long-distance transmission by alternating current was just emerging from the experimental stage. The station became part of Ontario Hydro history in 1910 when the Commission built a four-mile transmission line and a substation to service the City of Port Arthur with power purchased from the Kakabeka development. This 24,200-kilowatt plant was acquired by Ontario Hydro in 1949.

Known as "the little Niagara of the Northwest," Kakabeka Falls G.S. utilizes the fall in the Kaministikwia River both above and below the cataract by means of four concrete dams. It is one of the most picturesque of the Commission's stations.

## silver falls g.s.

More power from the Kaministikwia was added to the Ontario Hydro system in 1959 with the opening of its 45,000-kilowatt plant at Silver Falls, largest of several cataracts in a winding five-mile section of the river. To take the fullest advantage of the 350-foot drop in the river, engineers bored a two-mile tunnel through a granite ridge to link the intake at Dog Lake with the powerhouse at Little Dog Lake.

Excavation of the tunnel took 11 months, with hardrock miners working three shifts a day, six days a week.



One of the most striking features at Silver Falls is the 180-foot-high surge tank to the north of the powerhouse. The tank has a capacity of 1¼ million gallons and is connected to the power tunnel by a 204-foot shaft. Designed primarily to act as a safety valve against the tremendous pressure of the two-mile column of water in the tunnel should the turbines be shut down quickly, the surge tank also provides a ready supply of water to take care of sudden increases in electrical demand on the generator.

Silver Falls G.S. is operated by remote control from Thunder Bay, 30 miles to the southeast. Its generators can be started, brought up to speed, and put on line at the push of a button.

# winnipeg river

## whitedog falls g.s.

The Winnipeg River, in the 18th century the main artery to the Canadian West for adventurous explorers and fur traders, took on a more significant economic role in 1958 with the opening of Ontario Hydro's Whitedog Falls generating station.

Construction of this 64,800-kilowatt plant necessitated the building of a 17-mile access road to the site from Minaki, the nearest rail point. The road was extended to the Commission's Caribou Falls plant on the English River and has since been joined with the provincial highway system. It is maintained by the government. The generating station is operated by a supervisory control system from the Commission's switching station at Kenora, 49 miles to the southeast, and is normally unattended.

Remote control is a far cry from the days of such explorers as Radisson and La Verendrye, but it is appropriate that this historic river draining some 44,000 square miles and dropping over rapids and cascades for a distance of 160 miles should one day supply electric power for the homes and industries of the Northwest.

# aguasabon river

## aguasabon g.s.

Located at Terrace Bay, where the Aguasabon River flows into Lake Superior, Aguasabon generating station began supplying power to the Northwestern Region in 1948. The town of Terrace Bay, nearby pulp mills and other industries were among the first to benefit from the station's 40,500 kilowatt output.

The Aguasabon plant is unusual in that the main dam, intake structure, and powerhouse are widely separated. Spanning the river about 1½ miles above its outlet into Lake Superior, the main dam is 1,400 feet long and 120 feet high. The intake structure is at Hays Lake, about three-quarters of a mile from the powerhouse.

Water drops at the intake structure 270 feet through a 15-foot-diameter shaft bored through

rock to a 3,500-foot tunnel of equal diameter, and from the tunnel into the penstock in which the flow divides to feed the station's two turbines. Like Silver Falls G.S. on the Kaministikwia, the Aguasabon plant has a towering surge tank, 240-feet high, near the powerhouse.

## power from coal

### thunder bay g.s.

Thunder Bay generating station is Ontario Hydro's only thermal-electric station in Northwestern Ontario. Equivalent in height to a 13-storey building, this coal-burning station is located on an island in the delta of the Kaministikwia River within the municipal limits of Thunder Bay.

Less romantic, perhaps, than the hydro-electric stations with their picturesque settings and evocative names, Thunder Bay has none-the-less been a vital factor in insuring adequate electrical supply for the northwest. It began operating in 1963.

Construction of the 100,000-kilowatt plant was undertaken in 1958 to fill a double need: to meet sharp increases in demand predicted by industrial customers, and to back up hydro-electric resources in the event of low stream flows. The station served in this standby capacity until the end of 1966, when it was placed in regular service.

The Thunder Bay plant has dock facilities designed to handle ships of up to 25,000 tons. These bring in the coal which the station consumes at the rate of 40 tons an hour when operating at full capacity.

In keeping with Commission policy of installing the most efficient air quality control equipment available in its thermal-electric stations, Thunder Bay G.S. has equipment designed to remove up to 99 per cent of fly-ash (solid materials) from exhaust gases before they reach the plant's 350-foot chimney. The height of the chimney ensures dispersal of flue gases high into the atmosphere, as yet the most effective means known of dealing with this problem.

Water for condenser cooling at the Thunder Bay station is drawn from the mouth of the

Mission River at the rate of 80,000 gallons a minute and discharged slightly warmer, but no less clean, into Lake Superior.

Two oil-fired combustion turbine units with a total capacity of 28,300 kilowatts are located at the station site to provide standby service and operational flexibility in case of difficulty with other equipment. In an emergency, the two combustion turbine units can be brought into production quickly.

# facts about the stations

## nipigon river

Cameron Falls G.S. - 65 miles northeast of Thunder Bay; 72,000 kilowatts from seven units; first service in 1920. Cost $15.7 million.

Pine Portage G.S. - 12 miles upstream from Cameron Falls; 128,700 kilowatts from four units; first service in 1950. Cost $32.5 million.

Alexander G.S. - 1½ miles south of Cameron Falls; 65,300 kilowatts from five units; first service in 1930. Cost $12.4 million.

## winnipeg river

Whitedog Falls G.S. - 49 miles northwest of Kenora; 64,800 kilowatts from three units; first service in 1958. Cost $21.3 million.

## english river

Ear Falls G.S. - near Dryden; 18,600 kilowatts from four units; first service in 1929. Cost $4.9 million.

Manitou Falls G.S. - 20 miles downstream from Ear Falls; 72,000 kilowatts from five units; first service in 1956. Cost $15.5 million.

Caribou Falls G.S. - 40 miles northwest of Kenora; 77,000 kilowatts from three units; first service in 1958. Cost $24.2 million.

## kaministikwia river

Kakabeka Falls G.S. - 20 miles west of Thunder Bay; 24,200 kilowatts from four units; first service in 1906. Acquired by Ontario Hydro from private interests in 1949.

Silver Falls G.S. - 30 miles northwest of Thunder Bay; 45,000 kilowatts from one unit; first service in 1959. Cost $16 million.

## aguasabon river

Aguasabon G.S. - at Terrace Bay on north shore of Lake Superior; 40,500 kilowatts from two units; first service in 1948. Cost $12.8 million.

## thermal-electric

Thunder Bay G.S. - in the City of Thunder Bay; 100,000 kilowatts from one unit; first service in 1963. Cost $27.6 million.